
JMJD5 regulates cell cycle and pluripotency in human embryonic stem cells.

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Authors: Hui Zhu, Shijun Hu, Julie Baker

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Public Summary:

Scientific Abstract:

In mammalian embryos, embryonic stem cells and induced pluripotent cells, a shortened G1 phase is correlated with the pluripotent state. To molecularly define this phase, we compared transcripts from the shortened G1 of human embryonic stem cells (hESCs) with those from the longer G1 of derived endoderm. We identified JMJD5, a JmjC (Jumonji C) domain containing protein that, when depleted in hESCs, causes the accumulation of cells in G1 phase, loss of pluripotency and subsequent differentiation into multiple lineages, most prominently ectoderm and trophectoderm. Further, we demonstrate that the JMJD5 phenotype is caused by the upregulation of CDKN1A (p21), as depleting both JMJD5 and CDKN1A (p21) in hESCs restores the rapid G1 phase and rescues the pluripotent state. Overall, we provide genetic and biochemical evidence that the JMJD5/CDKN1A (p21) axis is essential to maintaining the short G1 phase which is critical for pluripotency in hESCs. Stem Cells 2014.

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